Implementation Plan for the Roanoke River TMDLs

Government

Working Group Meeting

February 28, 2014

THE Louis Berger Group, INC.

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Agenda

- Implementation Plan Process and Group Goals
- Watershed Overview
- TMDL Review
- Clean-up Plan Approach
- Clean-up Actions
- Units and Costs
- Funding

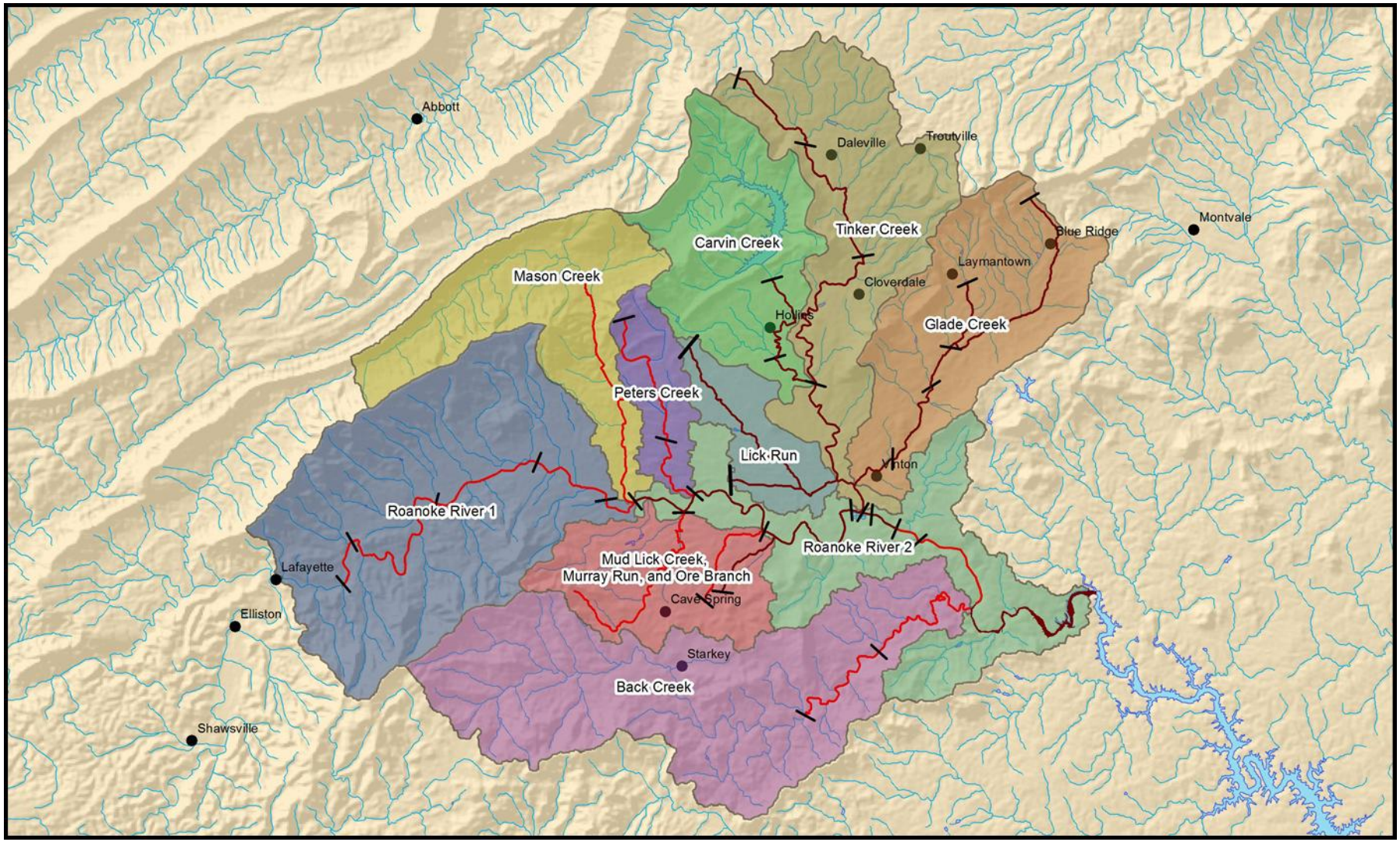
Adaptive Implementation Approach

Overarching Project Goal is to Design a Clean-up Plan including:

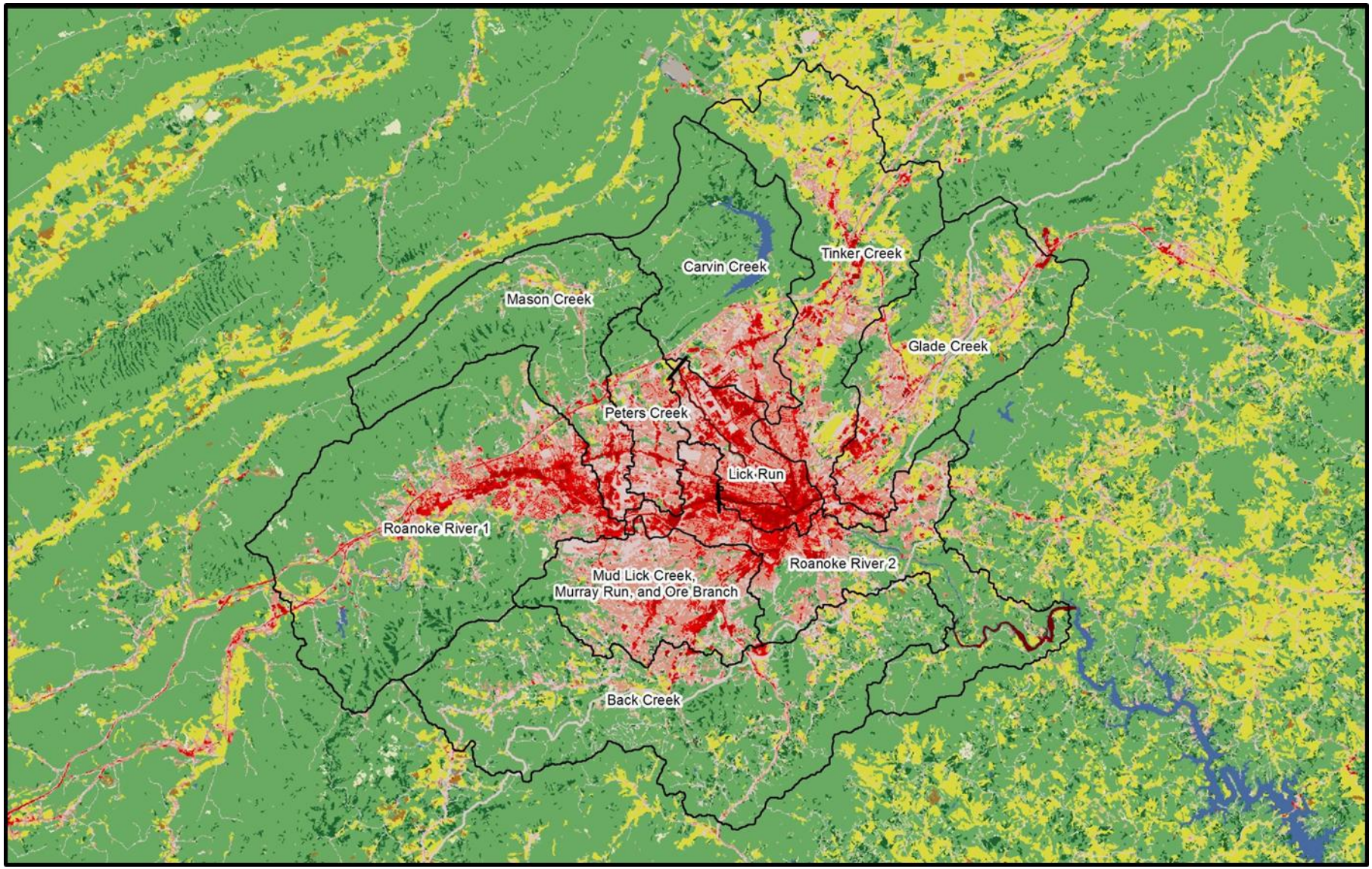
- Appropriate types and numbers of Best Management Practices designed to meet sediment and bacteria reduction goals called for in the Roanoke River watershed TMDL Reports
- Measurable Goals and Milestones for achieving water quality goals
- List and description of potential funding sources

- **Meeting Goals**: Discuss revised estimates of Best Management Practices by subwatershed that will result in reductions of urban, residential, and agricultural bacteria and sediment loads.

Overview of the Watershed



NLCD 2006 Landuse



NLCD 2006 Landuse

NLCD 2006 Landuse Percentages by Subwatershed										
Source	**Carvin Creek**	**Glade Creek**	**Lick Run**	**Tinker Creek**	**Back Creek**	**Mason Creek**	**Mud Lick Creek, Murray Run, and Ore Branch**	**Peters Creek**	**Roanoke River 1**	**Roanoke River 2**
Developed	23.27%	33.67%	97.43%	35.83%	18.36%	19.99%	73.63%	65.96%	13.59%	26.35%
Cropland	0.00%	0.32%	0.00%	0.11%	0.17%	0.05%	0.03%	0.00%	0.02%	0.001%
Pasture/Hay	2.98%	19.01%	0.89%	28.20%	7.54%	2.77%	1.41%	3.12%	0.87%	0.45%
Forest	69.56%	46.85%	1.65%	35.43%	73.28%	76.47%	24.64%	30.69%	84.64%	72.75%
Water/Wetlands	3.95%	0.10%	0.02%	0.20%	0.05%	0.02%	0.03%	0.00%	0.17%	0.39%
Other*	0.25%	0.05%	0.01%	0.23%	0.59%	0.70%	0.26%	0.23%	0.71%	0.06%

*Includes Barren Land, Grassland/Herbaceous, Scrub/Shrub

Roanoke River Watershed Allocations

TMDL Bacteria Reductions by Source										
Source	**Back Creek**	**Carvin Creek**	**Glade Creek**	**Lick Run**	**Mason Creek**	**Mud Lick Creek, Murray Run, and Ore Branch**	**Peters Creek**	**Roanoke River 1**	**Roanoke River 2**	**Tinker Creek**
Developed	98.9%	90.2%	96.3%	98.5%	98.9%	99.6%	98.9%	96.5%	98.2%	98.6%
Cropland	98.9%	0.0%	96.3%	0.0%	98.9%	99.6%	0.0%	96.5%	98.2%	99.8%
Pasture/Hay	98.9%	90.2%	96.3%	91.0%	98.9%	99.6%	98.9%	96.5%	98.2%	99.8%
Forest	98.9%	85.2%	91.5%	0.0%	98.9%	99.6%	98.9%	96.5%	98.2%	95.0%
Water/Wetlands	0.0%	85.2%	91.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	95.0%
Other	98.9%	90.2%	96.3%	0.0%	98.9%	99.6%	98.9%	96.5%	98.2%	98.0%
Livestock Direct	100.0%	100.0%	100.0%	0.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Wildlife Direct	64.5%	75.0%	70.0%	0.0%	65.1%	87.9%	53.7%	67.1%	66.0%	0.0%
Straight Pipes and Sewer Overflows	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Roanoke River TMDL Sediment Reductions		
Landuse Category		**Percent Reduction**
Land Sources	Developed	75%
	Cropland	75%
	Pasture/Hay	75%
	Forest	75%
	Water/Wetlands	0%
	Other	75%
Instream Erosion	-	75%

Clean-up Plan Actions

- Indirect measures refers to outreach, educational programs, and signage.

- Indirect measures intend to change behaviors and attitudes of watershed citizenry through outreach and education. Several examples of indirect measures to be considered in this plan include:
  - Pet Waste Education Campaign
  - Pet Waste Signage
  - Outreach and Education of Agricultural BMPs

Clean-up Plan Actions

- Preventative actions and installations that target pollutants at their source a is a very cost-effective measure of reducing bacteria/sediment in stormwater

- The following are examples of preventative Best Management Practices (BMPs) being considered in the subwatersheds:
  - Livestock Exclusion Systems
  - Manure Storage
  - Residential Waste Treatment BMPs
  - Proper Pet Waste disposal
    - Pet Waste Stations

Clean-up Plan Actions

- Refers to actions and installations that intercept pollutants before they reach our waterways

- The following are examples of Best Management Practices (BMPs) being considered in the subwatersheds:
  - Existing Stormwater BMP Retrofits
  - Low Impact Development Stormwater BMPs
  - Raingardens
  - Continuous No-Till
  - Cover Crops

Residential BMPs

Sewage Disposal

- Septic System Pump out (RB-1)
  - 10% of All Septic Systems
- Sewer Connection (RB-2)
  - Targeted Approach based on VDH consultation
- Repaired Septic System (RB-3)
  - All Failing Septic Systems for houses built after 1964
- Septic System Installation/Replacement (RB-4)
  - All Failing Septic Systems for houses built before 1964
- Alternative Waste Treatment System Installation (RB-5)
  - 5% of all failing septic systems

Residential BMPs

Pet Waste

- Pet Waste Stations
  - Proposed one station every two miles of residential road
- Pet Waste Digester/Composter
- Educational Campaign
  - Proposed one campaign per subwatershed

Residential BMPs

Residential BMPs	Sediment Removal Efficiency	Bacteria Removal Efficiency
Pet Waste		
Educational Campaign	NA	25%
Pet Waste Stations	NA	NA
Residential Waste		
Total Septic Pump out (RB-1)	NA	5%
Sewer Connection (RB-2)	NA	100%
Total Septic Repair (RB-3)	NA	100%
Total Septic Install/Replace (RB-4)	NA	100%
Total Alternative Waste Treatment System (RB-5)	NA	100%

Agricultural BMPs

Cropland

- Continuous No-Till (SL-15)
- Small Grain Cover Crop (SL-8)
- Permanent Vegetative Cover on Cropland (SL-1)
- Sod Waterways (WP-3)

Agricultural BMPs

Livestock Exclusion and Manure Management

- CREP Livestock Exclusion (CRSL-6)
- Livestock Exclusion with Grazing Land Management (SL-6T)
- Small Acreage Grazing Systems (SL-6A)
- Livestock Exclusion with Riparian Buffers (LE-1T)
- Livestock Exclusion with Reduced Setback (LE-2T)
- Stream Protection/Fencing (WP-2T)
- Manure Storage (WP-4)

Agricultural BMPs

Pasture

- Vegetative Cover on Critical Areas (SL-11)
  - 10-20% of Pastureland
- Reforestation of Erodible Pasture (FR-1)
  - 5-10% of Pastureland
- Pasture Management (EQIP 528, SL-10T)
  - Remainder of Pastureland

Agricultural BMPs

Agricultural BMPs	Sediment Removal Efficiency	Bacteria Removal Efficiency
Cropland		
Continuous No-Till (SL-15)	70%	70%
Small Grain Cover Crop (SL-8)	20%	20%
Permanent Vegetative Cover on Cropland (SL-1)	75%	75%
Sod Waterways (WP-3)	50%	50%
Cropland Buffers (CP-33 and WQ-1)	50%	50%
Livestock Exclusion System		
CREP Livestock Exclusion (CRSL-6)	56%	100%
Livestock Exclusion (SL-6T/LE-1T)	56%	100%
Livestock Exclusion w/ Reduced Setback (LE-2T)	56%	100%
Small Acreage Grazing System (SL-6AT)	56%	100%
Stream Protection/Fencing (WP-2T)	56%	100%
Manure Storage (WP-4) - Dairy	NA	80%
Manure Storage (WP-4) - Beef	NA	80%
Pasture		
Vegetative Cover on Critical Areas (SL-11)	75%	75%
Reforestation of Erodible Pasture (FR-1)	LU Conversion	LU Conversion
Pasture Management (EQIP 528, SL-10T)	30%	50%

Urban BMPs

Existing Stormwater BMPs

- Accounted for installed BMPs at ½ normal efficiency

Stormwater Retrofits

- Infiltration Basin/Trench Retrofit
- Constructed Wetland Retrofit

New Stormwater BMPs

- Bioretention
- Rain Garden
- Infiltration Basin/Trench
- Manufactured BMP
- Constructed Wetland

Urban BMPs

New Stormwater BMPs (continued)

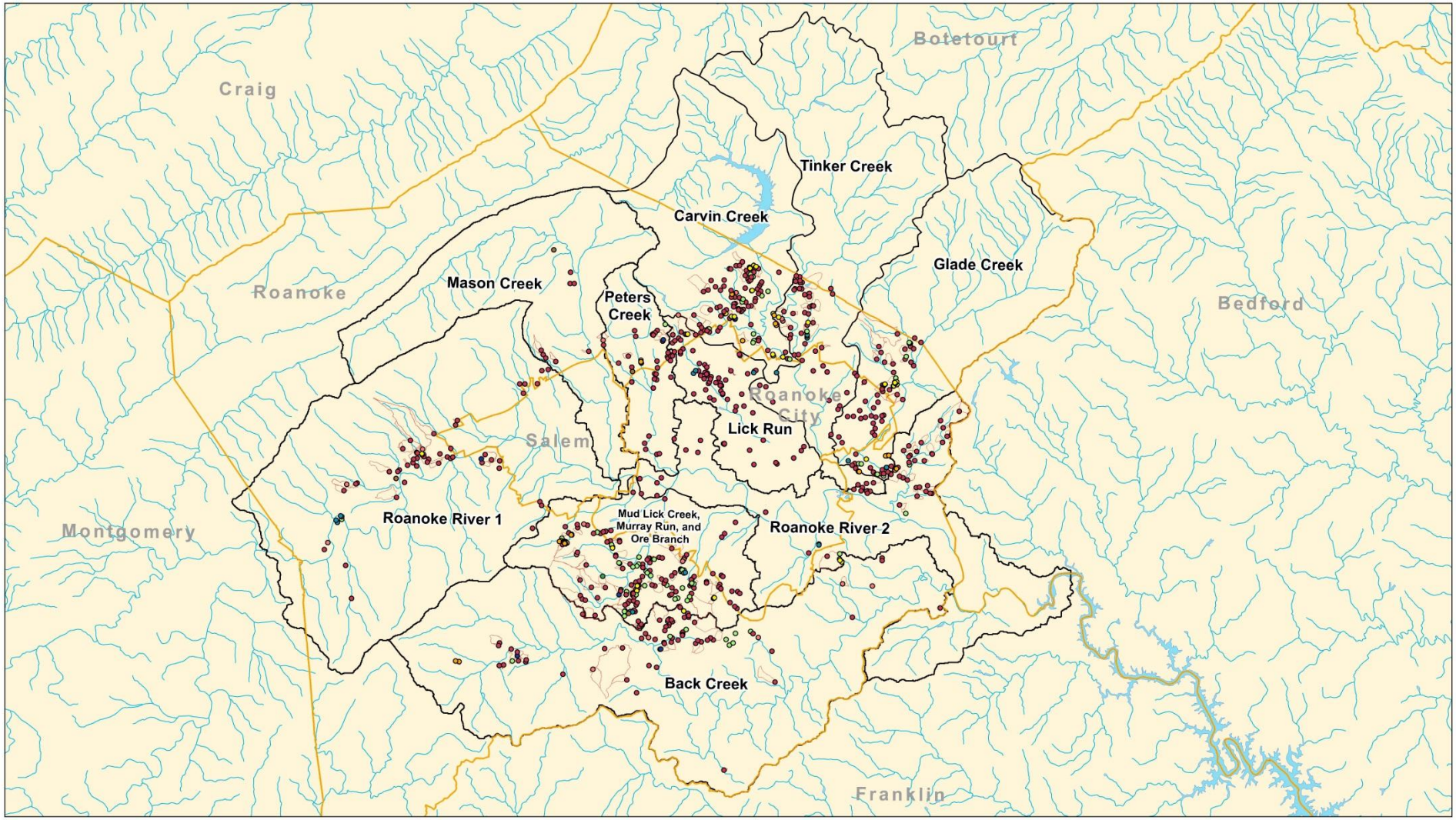
- Riparian Buffer (Forested or Grass/Shrub)
  - Currently estimated at 10% of urban streams
- Street Sweeping
- Vegetated Swale

Urban BMPs

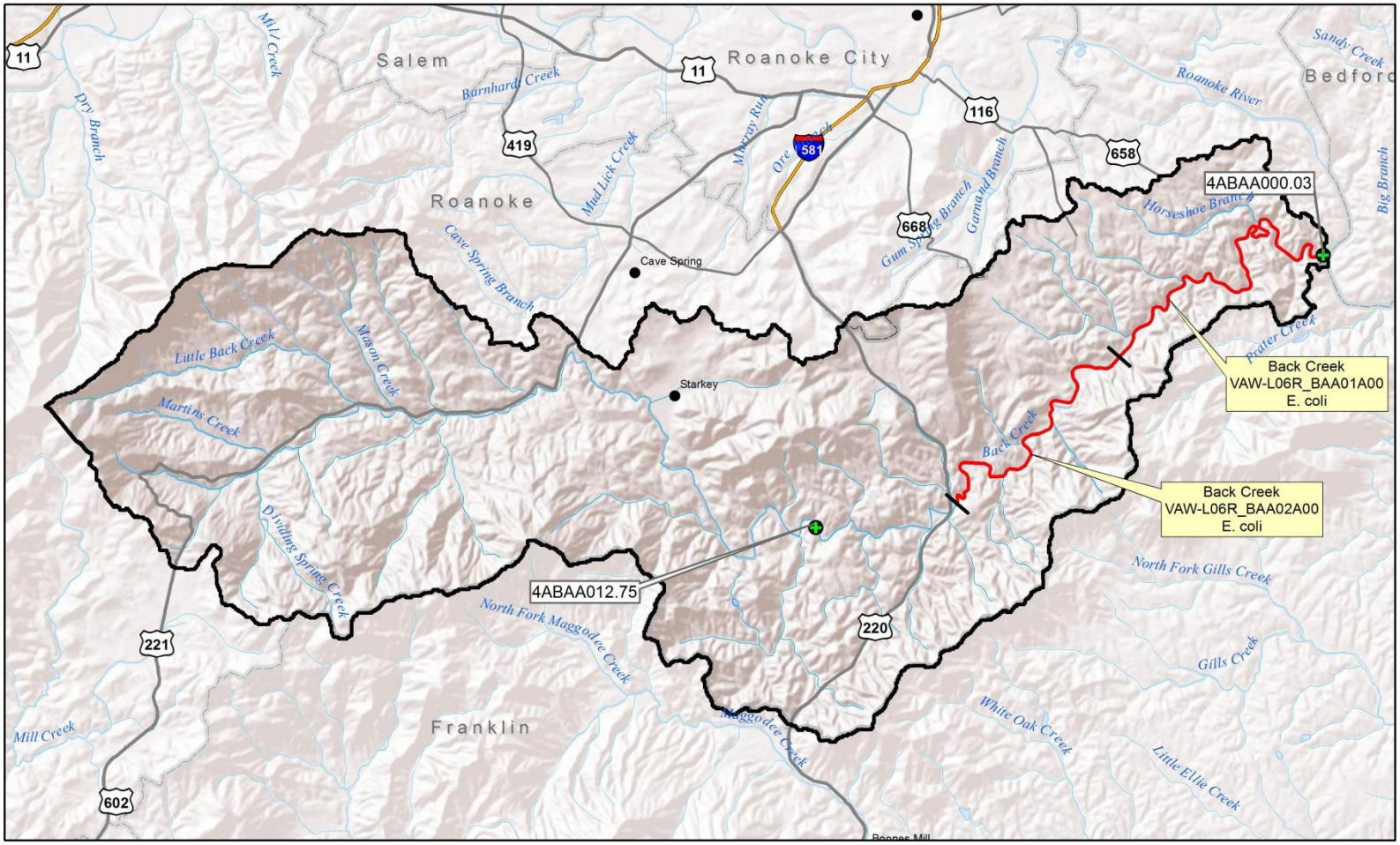
Detention Pond Retrofits				
Urban BMPs	Detention Pond Efficiency		Retrofitted Efficiency	
	Sediment Removal Efficiency	Bacteria Removal Efficiency	Sediment Removal Efficiency	Bacteria Removal Efficiency
Infiltration Basin/Trench	50%	30%	75%	90%
Constructed Wetland			50%	80%

Stormwater BMPs		
Urban BMPs	Sediment Removal Efficiency	Bacteria Removal Efficiency
Bioretention	70%	90%
Raingarden	70%	70%
Infiltration Basin/Trench	75%	90%
Manufactured BMP	80%	80%
Constructed Wetland	50%	80%
Riparian Buffer (Forested)	70%	57%
Riparian Buffer (Grass/Shrub)	50%	50%

Existing Stormwater BMPs



Back Creek Subwatershed



Back Creek Subwatershed

Residential BMPs	Units	Cost/unit	Total Cost
Pet Waste			
Educational Campaign	1	$3,750	$3,750
Pet Waste Stations	102	$170	$17,312
Residential Waste			
Total Septic Pump out (RB-1)	432	$300	$129,665
Sewer Connection (RB-2)	94	$10,000	$940,000
Total Septic Repair (RB-3)	328	$3,600	$1,181,729
Total Septic Install/Replace (RB-4)	352	$6,000	$2,111,018
Total Alternative Waste Treatment System (RB-5)	34	$16,000	$539,407

Back Creek Subwatershed

Agricultural BMPs	Units	Cost Basis	Cost/unit	Total Cost
Cropland				
Continuous No-Till (SL-15)	62.6	Acres	$100	$6,265
Small Grain Cover Crop (SL-8)	62.6	Acres	$30	$1,879
Permanent Vegetative Cover on Cropland (SL-1)	0.0	Acres	$175	$0
Sod Waterways (WP-3)	0.0	Acres	$1,600	$0
Cropland Buffers (CP-33 and WQ-1)	0.0	Acres	$600	$0
Livestock Exclusion System				
CREP Livestock Exclusion (CRSL-6)	0.0	System	$27,000	$0
Livestock Exclusion (SL-6T/LE-1T)	34.7	System	$21,000	$729,069
Livestock Exclusion w/ Reduced Setback (LE-2T)	3.6	System	$17,000	$60,561
Small Acreage Grazing System (SL-6AT)	2.0	System	$9,000	$18,380
Stream Protection/Fencing (WP-2T)	1.0	System	$5,000	$21,322
Manure Storage (WP-4) - Dairy	6	System	$100,000	$646,671
Manure Storage (WP-4) - Beef	6	System	$58,000	$375,069
Pasture				
Vegetative Cover on Critical Areas (SL-11)	269	Acres	$1,200	$323,336
Reforestation of Erodible Pasture (FR-1)	142	Acres	$560	$79,416
Pasture Management (EQIP 528, SL-10T)	2,694	Acres	$75	$202,085

Back Creek Subwatershed

Urban BMPs	Units	Area Treated (acres)	Unit	Cost/unit	Total Cost
Detention Pond Retrofits					
Infiltration Basin/Trench	37	1160	acre-treated	$6,000	$6,960,378
Constructed Wetland	17	545	acre-treated	$2,900	$1,581,488
Stormwater BMPs					
Bioretention	131	1,301	acre-treated	$10,000	$13,005,647
Raingarden	131	131	acre-treated	$5,000	$655,000
Infiltration Basin/Trench	131	130	acre-treated	$6,000	$782,581
Manufactured BMP	131	158	acre-treated	$20,000	$3,163,925
Constructed Wetland	131	3,755	acre-treated	$2,900	$10,889,910
Riparian Buffer (Forested)	N/A	12	acre-treated	$3,500	$40,289
Riparian Buffer (Grass/Shrub)	N/A	12	acre-treated	$360	$4,144

Stream Restoration

Planned and Proposed Stream Restoration for Roanoke River IP Phase I				
Subwatershed	**Total Estimated Stream Length for Restoration (Feet)**	**Planned or Ongoing Projects (feet)**	**Additional Proposed Stream Restoration (feet)**	**Cost ($300/foot of Restoration)**
Carvin Creek	12,433	0	12,433	$3,729,997
Glade Creek	11,818	4,720	7,098	$2,129,440
Lick Run	1,203	0	1,203	$360,752
Mason Creek	10,264	0	10,264	$3,079,070
Mud Lick Creek, Murray Run, and Ore Branch	5,482	4,360	1,122	$336,551
Peters Creek	2,245	0	2,245	$673,632
Roanoke River 1	22,506	0	22,506	$6,751,844
Roanoke River 2	2,674	1,000	1,674	$502,156
Tinker Creek	14,999	1,350	13,649	$4,094,669
Total	**83,624**	**11,430**	**72,194**	**$21,658,111**

Additional Implementation Measures/BMPs for Consideration

Residential

- Pet waste digesters
- Watershed area signage medallions "*No Dumping – Drains to Waterway*"
- Vegetated swale
- "Pearl Homes"

Agricultural

- Stream bank stabilization (WP-2A)
- Equine manure storage facilities

Urban

- Swales
- Street Sweeping
- Green Roofs
- Enhanced Erosion and Sediment Control
- Pervious Pavement

Funding Sources

- USDA Programs – Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), Environmental Quality Incentives Program (EQIP)
- EPA Section 319 Funds
- Water Quality Improvement Fund
- State Revolving Loan Funds
- State Cost-Share Program
- State Tax Credits
- Agricultural Best Management Practices Loan Program
- VA Small Business Environmental Assistance Fund Load Program
- Community Development Block Grant Program
- Southeast Rural Community Assistance Program (SER-CAP)
- Wetland Reserve Program (WRP)

TMDL Contacts

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Reports/presentations available at:

http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLImplementation/TMDLImplementationProgress.aspx

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